

CLAIMS

[1] A method for producing 3-hydroxypropionaldehyde which comprises a step of dehydrating glycerin using a microbial cell and/or a treated microbial cell containing diol dehydratase and/or glycerol dehydratase, and optionally diol dehydratase reactivating factor and/or glycerol dehydratase reactivating factor, under conditions so as to give a value (X/Y^2) calculated by dividing a catalytic amount $[X \text{ (U/g glycerin)}]$ of diol dehydratase and/or glycerol dehydratase by square of glycerin concentration $[Y \text{ (g/100 ml)}]$ within a range of 10 to 8,000, to produce 3-hydroxypropionaldehyde.

[2] A method according to claim 1, wherein the dehydration of glycerin is performed using a microbial cell under aerobic conditions.

[3] A method according to claim 1, wherein the dehydration of glycerin is performed using a treated microbial cell.

[4] A method for producing 1,3-propanediol which comprises a step of removing the microbial cell and/or treated microbial cell from the 3-hydroxypropionaldehyde produced by the method set forth in any one of claims 1 to 3, subsequently hydrogenating said 3-hydroxypropionaldehyde to produce 1,3-propanediol.

[5] A method for producing 3-hydroxypropionic acid which comprises a step of oxidizing the 3-hydroxypropionaldehyde produced by the method set forth in any one of claims 1 to 3 to produce 3-hydroxypropionic acid.

[6] A method for producing acrolein which comprises a step of reacting the 3-hydroxypropionaldehyde produced by the method set forth in any one of claims 1 to 3 under acidic conditions, to produce acrolein.

[7] A method for producing acrylic acid which comprises a

step of oxidizing the acrolein produced by the method set forth in claim 6 to produce acrylic acid.

[8] A method for producing an acrylic ester which comprises a step of subjecting the acrolein produced by the method set forth in claim 6 to the oxidative esterification, to produce
5 an acrylic ester.